MECHANISM FOR IMPROVING THE SEALING FUNCTION FOR A SLIDE OUT ROOM OF A RECREATIONAL VEHICLE

[0001] This application claims the benefit of United States Provisional Patent Application Serial Numbers 60/240,235 filed October 13, 2000 and 60/268,819, filed February 14, 2001, the complete disclosure of which is hereby expressly incorporated by reference.

SUMMARY OF THE INVENTION

Field Of the Invention

[0002] This invention relates to a latching mechanism for latching a slide out room of mobile living quarters (such as a recreational vehicle) to the main living area when the slide out room is retracted into the main living area.

Review of the Prior Art

[0003] The width of mobile living quarters, such as recreational vehicles, is limited to that which may be accommodated for travel on the public highways. Accordingly, it has become commonplace to provide for so-called slide out rooms which can be fully retracted into the vehicle for travel, and extended to enlarge the living area inside the vehicle when parked. For example, a common slide out area is in the living room area where a sofa abuts the back wall of the slide out room. When the room is to be enlarged, the slide out room together with the sofa projects outwardly to provide an enlarged floor space. Other manufacturers have other areas, such as a sleeping area, which can be enlarged by projecting an auxiliary slide out room.

[0004] Slide out rooms are normally supported and moved by driving mechanisms including telescoping tubes which are mounted on the frame supporting the main living area and are operated by hydraulic rams or electric motors. Sealing is provided to seal the slide out room in both the retracted and extended positions, however, the slide out room is only semi-rigid, and portions of the room farthest from the hydraulic rams or motors are not sufficiently rigid that engagement with the seals can be assured. The driving mechanism can be adjusted so that the portion of the room closest to the mechanism (typically the bottom of the room) is drawn firmly against the seals when the room is

retracted, but the portion of the room farthest from the rams (typically the top of the room) may deflect sufficiently that the seals are not engaged.

[0005] A variety of attempts have been made to rectify this situation. First, some manufacturers have created the slide out room in a trapezoidal shape, as viewed from the side, such that the leading edge of the slide out room is the top edge of the back wall. Others have attempted to "jack" the lower edge upwardly so as to cause a tilting of the room inwardly at the upper edge. Accordingly, it has become customary to use so-called "travel locks" to latch and maintain the upper edge of a slide out room in a retracted position in firm engagement with the seals around the perimeter of the vehicle opening which receives the room. However, these travel locks must be engaged and disengaged manually. Manual travel locks may be inconvenient to operate because they are generally positioned on the inside of the vehicle on the ceiling. People also forget about the locks, and attempt to move the room out to an extended position with the locks in place, causing damage to any of the locks, the room and the vehicle.

[0006] Most manufacturers provide slide out rooms with a back wall having a peripherally extending lip that projects outwardly in all directions beyond the outer room dimensions such that when the room is in the fully retracted position, the lip is flush with the vehicle side wall. At least one sealing bead is typically provided which extends along the periphery of the lip and becomes compressed between the lip and vehicle side wall when the room is fully retracted. Thus, any latching mechanism which is devised should not violate the integrity of this seal during installation or operation.

[0007] The second sealing function is typically provided by a wiper seal which is located on the inwardly facing side and top edges of the room opening defined by the vehicle side wall. The wiper seal flexes against the slide out room to remove water and debris from the room side walls and ceiling to prevent such water and debris from entering the main living area. This wiper seal also should not be violated or damaged in any way.

[0008] Finally, since the upper edge of the slide out room lip tends to tilt outwardly relative to the lower edge when the room is being retracted, a desirable latching mechanism should take into account that during the last several inches of inward travel, the lower edge may lead the upper edge. Thus, to ensure that the lower edge and upper edge firmly seal against the vehicle side wall, the upper edge must continue to travel inwardly after the lower edge has engaged the vehicle side wall. This factor is especially significant if an automatic system is devised which automatically latches the room into

place in response only to the room movement, and draws the room firmly into engagement with the associated peripheral sealing.

[0009] The present invention provides a latching mechanism for a slide out room that latches the slide out room to the vehicle side wall so that the sealing around the periphery of the room is engaged with the vehicle side wall, thereby preventing entry of moisture or other environmental elements into the vehicle. The latching mechanism is responsive to relative movement between the slide out room and the vehicle side wall to engage the latch as the slide out room reaches the fully retracted position. The latching mechanism may also disengage the latch as the slide out room begins to move away from the fully retracted position. In this way, the slide out room may be automatically latched to the main living area when the slide out room is retracted for travel and automatically unlatched as the room is extended for use.

[00010] These and other advantages of the present invention will become more apparent and the invention better understood by reference to the following description in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[00011] Figure 1 is a perspective view of a recreational vehicle having a slide out room shown in an extended position;

[00012] Figure 2 is a perspective view similar to Figure 1;

[00013] Figure 3 is a partially fragmented, cross-sectional, side elevational view of a recreational vehicle with a slide out room in a retracted position;

[00014] Figure 4 is a partially fragmented, perspective view of a latching mechanism according to the present invention;

[00015] Figure 5 is a partially fragmented, exploded perspective view of the latching mechanism of Figure 4;

[00016] Figure 6 is a partially fragmented, perspective view of another latching mechanism according to the present invention;

[00017] Figures 7A and 7B are top views of the latching mechanism of Figure 6;

[00018] Figure 8 is a partially fragmented, perspective view of another latching mechanism according to the present invention;

[00019] Figures 9A and 9B are top views of the latching mechanism of Figure 8;

[00020] Figure 10 is a partially fragmented, perspective view of another latching mechanism according to the present invention;

[00021] Figure 11 is a partially fragmented, exploded perspective view of the latching mechanism of Figure 10;

[00022] Figure 12 is a partially fragmented, perspective view of another latching mechanism according to the present invention;

[00023] Figures 13A and 13B are top views of the latching mechanism of Figure 12;

[00024] Figure 14 is a partially fragmented, perspective view of another latching mechanism according to the present invention;

[00025] Figure 15A and 15B are top views of the latching mechanism of Figure 14;

[00026] Figures 16A and 16B are top views of another latching mechanism according to the present invention;

[00027] Figure 17 is a partially fragmented, perspective view of another latching mechanism according to the present invention;

[00028] Figures 18A and 18B are top views of the latching mechanism of Figure 17;

[00029] Figure 19 is a partially fragmented, perspective view of another latching mechanism according to the present invention;

[00030] Figures 20 and 21 are partially fragmented, perspective views of another latching mechanism according to the present invention;

[00031] Figure 22 is a perspective view of another latching mechanism according to the present invention;

[00032] Figure 23 is a partially fragmented, perspective view of the latching mechanism of Figure 22;

[00033] Figure 24 is a perspective view similar to Figure 22;

[00034] Figures 25 and 26 are perspective views of a manual lock according to the present invention;

[00035] Figure 27 is a perspective view of an actuator according to the present invention;

[00036] Figure 28 is a cross-sectional, side elevational view of the actuator of Figure 27;

[00037] Figure 29 is a perspective view of another actuator according to the present invention;

[00038] Figures 30 and 31 are perspective views of additional embodiments of an actuator according to the present invention;

[00039] Figure 32 is a fragmented, perspective view of another latching mechanism according to the present invention;

[00040] Figures 33 and 34 are perspective views of the latching mechanism of Figure 32, shown attached to a vehicle;

[00041] Figures 35 and 36 are side elevational views of the latching mechanism of Figure 32 mounted to a vehicle;

[00042] Figures 37 and 38 are side elevational views of another latching mechanism according to the present invention;

[00043] Figure 39 is a cross-sectional view taken substantially along line 39-39 of Figure 37;

[00044] Figure 40 is a cross-sectional view taken substantially along line 40-40 of Figure 38;

[00045] Figure 41 is a perspective view of another latching mechanism according to the present invention;

[00046] Figure 42 is a side, elevational view of the latching mechanism of Figure 41;

[00047] Figure 43 is a perspective view of another latching mechanism according to the present invention;

[00048] Figure 44 is a side, elevational view of the latching mechanism of Figure 43;

[00049] Figure 45 is a perspective view of another latching mechanism according to the present invention;

[00050] Figure 46 is a side, elevational view of the latching mechanism of Figure 45;

[00051] Figures 47 and 48 are side, elevational views of another latching mechanism according to the present invention;

[00052] Figure 49 is a perspective view of another latching mechanism according to the present invention;

[00053] Figure 50 is a perspective, cross-sectional view taken substantially along line 50-50 of Figure 49;

[00054] Figures 51A and 51B are top views of the latching mechanism of Figures 49 and 50;

[00055] Figures 52 and 53 are top views of another latching mechanism according to the present invention;

[00056] Figures 54 and 55 are partially fragmented, top plan views of another embodiment of the present invention;

[00057] Figure 56 is a perspective view of another latching mechanism according to the present invention;

[00058] Figure 57 is a perspective view of a portion of the latching mechanism shown in Figure 56;

[00059] Figure 58 is a side, elevational view of the latching mechanism of Figure 56;

[00060] Figures 59 and 60 are top views of the latching mechanism of Figure 56;

[00061] Figure 61 is a perspective view of another latching mechanism according to the present invention;

[00062] Figure 62 is a side, elevational view of the latching mechanism of Figure 61; and

[00063] Figure 63 is a perspective view of another latching mechanism according to the present invention;

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[00064] The embodiments of the invention described herein are not intended to be exhaustive or to limit the invention to the precise forms disclosed. Rather, the embodiments selected for description have been chosen to enable one skilled in the art to practice the invention.

[00065] Referring now to the drawings, particularly Figures 1 and 2, the mobile living quarters or vehicle is generally indicated by the numeral 10. Vehicle 10 is defined by side walls 12 and 14, end walls 16 and 18, an upper wall 19, and a floor 20. As shown in Figure 2, vehicle 10 is supported on longitudinally extending, transversely spaced frame members 22, 24. Side wall 12 defines an opening 30 for receiving a slide out room generally indicated by the numeral 32 which may be moved away from vehicle 10 to an

extended position to provide auxiliary living space when vehicle 10 is parked for use, and moved into vehicle 10 through opening 30 to a retracted position when vehicle 10 is to be moved.

[00066] Slide out room 32 includes a back wall 34, a ceiling 40, a floor 35 and opposite side walls 36, 38. Room 32 is supported for movement between the extended and retracted positions by a drive mechanism of conventional design including telescoping support tubes generally indicated by the numerals 44, 46. Back wall 34 includes a lip portion or fascia 47 that projects beyond ceiling 40, floor 35 and side walls 36, 38.

[00067] As shown in Figure 3, conventional seal 50 extends around the perimeter of fascia 47 and is compressed between fascia 47 and vehicle side wall 12 around the perimeter of opening 30 formed by vehicle side wall 12. A wiper seal 51 is mounted within the gap 31 formed between opening 30 and room ceiling 40 and room side walls 36, 38. Wiper seal 51 engages room 32 in a conventional manner to remove water and debris from the room as the room is retracted into vehicle 10.

[00068] Since support tubes 44, 46 and the hydraulic rams (not shown) which support and operate slide out room 32 are attached to the lower portion of back wall 34, complete retraction of the lower portion of slide out room 32 can be assured. However, since slide out room 32 cannot be made totally rigid and inherently deflects, portions of the room that are spaced away from the drive mechanism may not fully compress seal 50, thereby permitting rain, snow, and other environmental elements to enter the living areas of vehicle 10.

[00069] Referring now to Figure 4, one embodiment of a latching mechanism 100 according to the present invention generally includes a housing 110, a latch 112, an actuator 114, a link 116, a bracket 118, and a tab 120. Housing 110 includes side 122, side 124, side 126 and side 128 together defining an interior space 130. Side 128 extends beyond side 122 to form a flange 132 which includes a plurality of openings 134 for receiving fasteners 136 (one shown) which secure housing 110 to vehicle side wall 12. Side 128 also defines an opening 129 corresponding to the position of latch 112 and an opening 131 corresponding to the position of actuator 114. As shown, housing 110 is substantially disposed within gap 31 defined by opening 30 and room side wall 38. Latch 112, actuator 114, and link 116 are disposed substantially within housing 110 and will be further described with reference to Figure 5.

[00070] Bracket 118 includes a first portion 138 and a second portion 140. First portion 138 is substantially perpendicular to second portion 140 and includes openings 142 for receiving fasteners (not shown) which secure bracket 118 to room side wall 38. Tab 120 includes a first portion 144 which is welded or otherwise secured to second portion 140 of bracket 118, and a second portion 146 which extends at an angle away from second portion 140 of bracket 118. As shown, second portion 140 of bracket 118 is situated flat against fascia 47 of slide out room 32.

[00071] Referring now to Figure 5, latching mechanism 100 is shown without housing 110. Latch 112 includes a forward surface 148, a rearward surface 150, and side surfaces 152, 154. Forward surface 148 and side surfaces 152, 154 together define an opening 156 for receiving tab 120. As shown, opening 156 extends rearwardly toward rearward surface 150 and includes a lower angled surface 158, a vertical stop surface 160, and an upper, camming surface 162. Lower surface 158 and upper camming surface 162 define angles relative to forward surface 148 which substantially correspond to the angle between second portion 146 of tab 120 and second portion 140 of bracket 118. The outside dimensions of latch 112 substantially correspond to the inside dimensions of housing 110 such that latch 112 is guided by and slidable within housing 110 as will be further described below.

[00072] Latching mechanism 100 further includes a return spring 164 which is connected between an upper surface 166 of latch 112 and a cross post or bracket (not shown) mounted within housing 110. Link 116, which may be a cable, a rod, or other suitable linkage, is connected at one end to a lower surface 168 of latch 112 and at the other end to actuator 114.

[00073] Actuator 114 includes a pad 170, upper arms 172, 174, lower arms 176, 178, a pivot tube 180, an axle 182, and a pair of rollers 184, 186. Pad 170 is mounted to arms 172, 174, 176, 178 such that pad 170 can pivot or rock about a central portion of pad 170. Pad 170 includes a curved engagement surface 188 for engaging fascia 47 of room 32 as further described below. Pad 170 may alternatively include a flat engagement surface 196 as shown in Figure 4. Upper arms 172, 174 are connected to lower arms 176, 178 by a rod 190 which permits scissoring or pivoting action of the upper and lower arms relative to one another. Upper arms 172, 174 are fixedly connected to pivot tube 180. Lower arms 176, 178 are fixedly connected to axle 182. Pivot tube 180 defines a central opening 192. A pivot rod 194 extends through opening 192 between sides 122, 126 of

housing 110 such that pivot tube pivots about rod 194, but remains in a fixed position relative to housing 110 as shown in Figure 4. Rollers 184, 186 may be connected to axle 182 such that rollers 184, 186 rotate relative to axle 182 as they roll against the inner surfaces of sides 124, 128 of housing 110 during operation. Alternatively, rollers 184, 186 may be fixed relative to axle 182 and slide along the inner surfaces of housing 110 during operation. Link 116 is connected to axle 182 to permit cooperative operation of latch 112 and actuator 114 as further described below.

[00074] Referring again to Figure 4, as slide out room 32 is moved into the retracted position, fascia 47 engages pad 170 of actuator 114. As fascia 47 engages pad 170, upper arms 172, 174 and lower arms 176, 178 scissor relative to one another about rod 190. Since pivot tube 180 is fixed in position relative to housing 110 by pivot rod 194, this scissoring action causes axle 182 and rollers 184, 186 to move downwardly relative to housing 110. As axle 182 moves downwardly, rollers 184, 186 roll along the inner surface of side 124 of housing 110. Axle 182 pulls link 116 downwardly, thereby causing downward movement of latch 112. When this downward movement begins, fascia 47 of room 32 is close enough to housing 110 to permit second portion 146 of tab 120 to extend through opening 129 of housing side 128 into opening 156 of latch 112. As room 32 is further moved into the retracted position, the downward pulling of link 116 causes camming surface 162 of latch 112 to slide against second portion 146 of tab 120, thereby drawing room 32 against side wall 12 of vehicle 10 to firmly compress seal 50 between fascia 47 and side wall 12 along the upper portions of room 32. As room 32 is moved from the retracted position toward the extended position, return spring 164 pulls latch 112 upwardly, thereby releasing tab 120 to permit outward movement of room 32. The upward movement of latch 112 returns actuator 114 to its outwardly extended position through housing opening 131 as shown in Figure 4 by pulling axle 182 upwardly via link 116.

[00075] Figure 6 shows an alternate embodiment of the latching mechanism according to the present invention. As will be the case with all embodiments described herein, the reference designations of components also present in the same or similar form in previously described embodiments will be retained, but increased by a multiple of 100. In Figure 6, latching mechanism 200 is shown including a low profile housing 210 mounted to fascia 47 of room 32 and a bracket 218 and tab 220 mounted to a standard edge channel 201 within gap 31. As shown, latch 212 includes a body 203 which slides

within housing 210 and a protrusion 205 which extends through opening 229 formed by side 228 of housing 210. Protrusion 205 includes a forward surface 248, side surfaces 252, 254, a camming surface 262, and an upper surface 263. A return spring 264 extends between upper surface 263 and a post 265 mounted to housing 210. As was the case with the embodiment of Figures 4 and 5, camming surface 262 is angled to correspond with the angle of second portion 246 of tab 220.

[00076] As room 32 is moved into the retracted position, pad 270 of actuator 214 engages vehicle side wall 12, thereby causing downward movement of latch 212. As latch 212 moves downwardly, camming surface 262 cams against second portion 246 of tab 220, thereby drawing fascia 47 against the perimeter of opening 30 formed by vehicle side wall 12 to compress seal 50. When room 32 is extended, return spring 264 pulls latch 212 upwardly, disengaging latch 212 from tab 220 as was described above. Figure 7A shows room 32 approaching the retracted position. Figure 7B shows room 32 in the retracted position, wherein latch 212 is interlocked with tab 220.

[00077] Figures 8, 9A, and 9B show an alternate embodiment of the latching mechanism according to the present invention. As shown in Figure 8, latching mechanism 300 also includes a low profile housing 310 mounted to fascia 47. Protrusion 305 of latch 312 is narrow relative to protrusion 205 of Figure 6 and extends from body 303 through slot 329 formed in side 328 of housing 310. Protrusion 305 of latch 312 includes camming surface 362 and locking surface 307.

[00078] Link 316 includes cable segment 309 which is connected at one end to latch 312, cable segment 311 which is connected at one end to axle 382 of actuator 314, and compensator 313. Compensator 313 includes end 315A which is connected to cable segment 309, end 315B which is connected to cable segment 311, and intermediate spring 317 which coils between ends 315A, 315B.

[00079] Bracket 318 is mounted to edge channel 201 adjacent wiper 51. Bracket 318 includes side 319 which is connected to edge channel 201 with fasteners (not shown), side 321, side 323, and side 325. Together sides 319, 321, 323, 325 of bracket 318 form an interior space 327 for receiving protrusion 305 of latch 312 as described below.

[00080] As room 32 is moved to the retracted position, pad 370 of actuator 314 engages side wall 12 of vehicle 10 and causes downward movement of latch 312 as described above. As latch 312 moves downwardly, camming surface 362 extends into interior space 327 of bracket 318. Camming surface 362 engages the interior surface of

side 325 of bracket 318, thereby drawing fascia 47 against the perimeter of opening 30 formed by vehicle side wall 12 to compress seal 50. As latch 312 moves further downwardly, locking surface 307 of protrusion 305 slides against the interior surface of side 325 of bracket 318, thereby locking room 32 in the retracted position. Locking surface 307 is sufficiently long in the vertical direction to prevent engagement of bracket wall 325 with the upper portion of latch protrusion 305. This arrangement prevents the overstressing of link 316 which may occur if actuator 314 continued to pull latch 312 downwardly after the upper portion of protrusion 305 engaged wall 325. Compensator 313 is an alternate method of providing stress relief to link 316.

[00081] As room 32 is extended, return spring 364 withdraws protrusion 305 of latch 312 from interior space 327 of bracket 318. Additionally, actuator 314 is returned by link 316 and the upward movement of latch 312 to its outwardly extended position shown in Figure 8. Figure 9A shows latching mechanism 300 of Figure 8 when room 32 is approaching the retracted position. Figure 9B shows room 32 in the retracted position and protrusion 305 of latch 312 interlocked with bracket 318.

[00082] As should be apparent from the foregoing, housings 210 and 310 may readily be modified for mounting to vehicle side wall 12 in a manner similar to the mounting of housing 110 shown in Figure 4. As should be apparent to one skilled in the art, bracket 218 and channel 318 could also readily be mounted to fascia 47 of room 32 in the manner that bracket 118 of Figure 4 is mounted to fascia 47.

[00083] Referring now to Figures 10 and 11, an alternate embodiment latching mechanism 400 is shown. Latching mechanism 400 is similar to latching mechanism 100 of Figures 4 and 5. Latch 412 includes forward surface 448, side surfaces 452, 454, and rearward surface 450. Forward surface 448 and side surfaces 452, 454 define opening 456 which includes lower surface 458, stop surface 460, and lock surface 462. As shown, lock surface 462 is substantially parallel to stop surface 460.

[00084] Tab 420 includes first portion 444, second portion 446A and third portion 446B. When tab 420 is attached to bracket 418 as shown in Figure 10, third portion 446B is substantially parallel to second portion 440 of bracket 418.

[00085] In operation, as fascia 47 engages pad 470, actuator 414 draws latch 412 downwardly via link 416. The outward extension of pad 470 from housing 410 and the outward extension of third portion 446B of tab 420 from second portion 440 of bracket 418 are designed such that third portion 446B of tab 420 enters opening 456 of latch 412

and approaches contact with stop surface 460 before latch 412 moves substantially downwardly. Accordingly, third portion 446B clears lock surface 462 of latch 412. Therefore, when latch 412 moves downwardly, lock surface 462 engages and retains third portion 446B of tab 420, thereby locking room 32 in the retracted position. As room 32 is moved from the retracted position, return spring 464 pulls latch 412 upwardly such that third portion 446B of tab 420 clears lock surface 429 of latch 412 before substantial outward movement of room 32 begins.

[00086] Again, it should be understood that the mounting locations of housing 410 and bracket 418 may be reversed from those shown in Figures 10 and 11. Specifically, housing 410, latch 412, actuator 414, and link 416, may be mounted to fascia 47 of room 32, and bracket 418 may be mounted to an edge channel 201 in gap 31 between vehicle side wall 12 and room side wall 38.

[00087] Figures 12, 13A and 13B show an alternate embodiment of the latching mechanism according to the present invention. Housing 510 of latching mechanism 500 includes side 524 which is attached to side wall 12 of vehicle 10, sides 522, 526, and side 528 which faces fascia 47 of room 32. Side 528 defines opening 531 similar to that described with reference to Figure 4. Side 526 of housing 510 defines a slot 533 facing gap 31.

[00088] Latch 512 includes a body 503 and a protrusion 505 which is connected to a portion of body 503 that extends through slot 533. Accordingly, protrusion 505 is situated within gap 31 between vehicle side wall 12 and room side wall 38. Protrusion 505 includes a forward surface 548, a rearward surface 550, and side surfaces 552, 554. Protrusion 505 further includes camming surface 562 which extends between forward surface 548 and rearward surface 550.

[00089] In operation, fascia 47 engages pad 570 of actuator 514 causing downward movement of latch 512 via link 516. As latch 512 moves downwardly, protrusion 505 enters interior space 527 of bracket 518. Camming surface 562 engages the inner surface of side 525 of bracket 518. As latch 512 is drawn further downwardly, camming surface 562 draws fascia 47 into engagement with the perimeter of opening 30 defined by vehicle side wall 12 to compress seal 50. As described with reference to the previous embodiments, as room 32 is moved from the retracted position, return spring 564 pulls latch 512 upwardly, withdrawing protrusion 505 from interior space 527 of bracket 518.

[00090] As should be apparent from the foregoing, the positions of housing 510 and bracket 518 may be reversed such that housing 510 is mounted to room 32 and bracket 518 is mounted to vehicle side wall 12.

[00091] Figures 14, 15A, and 15B show an alternate embodiment of a latching mechanism according to the present invention. Latching mechanism 600 includes a latch 612, a link 616, and an actuator of any of the type described above (not shown). These components are mounted within standard edge channel 201 which has been modified to define opening 635, opening 637, and an opening (not shown) through which an actuator extends. Latch 612 is a substantially flat plate that defines two upwardly extending slots 639, 641, an upper opening 643, and a lower opening 645. Slot 639 includes camming surface 647. Similarly, slot 641 includes camming surface 649. A return spring 664 is connected at one end to latch 612 at opening 643. The other end of spring 664 extends through an opening 651 defined by plate 653 which is mounted within edge channel 201. Link 616 is connected to latch 612 at opening 645.

[00092] Latching mechanism 600 further includes a pair of spaced apart bolts 655, 657 which are substantially identical. Accordingly, only bolt 655 will be described. Bolt 655 includes a threaded portion 659 which is screwed into side wall 38 of room 32, a shoulder 661 which engages side wall 38 when threaded portion 659 is fully inserted, and a pin 663.

[00093] As shown in the figures, as room 32 approaches the retracted position, pins 663 of bolts 655, 657 pass through their respective openings 635, 637 of edge channel 201 into their respective slots 639, 641 of latch 612. When the actuator engages fascia 47 and draws latch 612 downwardly via link 616, camming surfaces 647, 649 ride along pins 663 of bolts 655, 657, respectively, to draw fascia 47 into engagement with the perimeter of opening 30 defined by vehicle side wall 12, thereby compressing seal 50 as shown in Figure 15B. When room 32 is moved from its retracted position, return spring 664 pulls latch 612 upwardly, thereby releasing bolts 655, 657. As should also be apparent from the drawings, a single rod 655 and a single notch 639 may be used to accomplish the function of the present invention. Additionally, a number of rods greater than two may be used in accordance with the teachings herein.

[00094] Figures 16A and 16B show a modified version of latching mechanism 600. Latching mechanism 700 includes a latch 712 which is substantially identical to latch 612, a link (not shown), and an actuator (not shown). These components are mounted within a

modified edge channel 767 as will be described below. Instead of bolts 655, 657, latching mechanism 700 includes a bracket 718 having a first portion 738 connected to room side wall 38, a second portion 740 mounted adjacent fascia 47, and a right angle pin 765 extending between first portion 738 and second portion 740. As should be apparent from the foregoing, pin 765 passes through an opening 735 in edge channel 767 to be engaged and retained by latch 712 as described above.

[00095] Edge channel 767 includes a first portion 769 which is mounted to vehicle side wall 12 in a standard fashion. A second portion 771 extends from first portion 769 at a right angle and includes extension 773 for mounting wiper seal 51. Edge channel 767 further includes a third portion 775 having a pair of parallel walls 777 for receiving second portion 771. Third portion 775 further defines a plurality of openings 779 (one shown) through which standard fasteners 781 (one shown) extend to mount third portion 775 to vehicle side wall 12. Accordingly, third portion 775 may be removed to service or adjust latch 712, the link (not shown), or the actuator (not shown).

[00096] Figures 17, 18A, and 18B show another embodiment of a latching mechanism according to the present invention. Latching mechanism 800 includes latch 812, link 816, and actuator 814, all mounted within modified edge channel 801. Latch 812 includes a body 883 pivotally mounted on pin 885 which is connected to edge channel 801, and a finger 887. Body 883 includes a curved surface 889 and an opening 891. Link 816 wraps around curved surface 889 and extends into opening 891 where it is retained by a conventional retainer (not shown). Body 883 further includes a second opening 893 for receiving one end of return spring 864. The other end of return spring 864 is connected to a post 895 connected to edge channel 801. Finger 887 of latch 812 includes a camming surface 897. In operation, finger 887 extends through an opening 899 formed in edge channel 801 as will be further described below.

[00097] Actuator 814 includes a first portion 802 which extends through a slot 831 formed in edge channel 801 and carries pad 870. Pad 870 includes engagement surface 896. Actuator 814 further includes a barrel 804 mounted for rotation on a pin 806 connected to edge channel 801, and a second portion 808 disposed within edge channel 801 and connected to barrel 804. Second portion 808 includes an opening 810 which receives and retains link 816. As should be apparent from the foregoing, actuator 814 may be modified to be used with any of the latching mechanisms described above.

[00098] Bracket 818 includes a plate 820 with openings 822 for receiving standard fasteners (not shown) to attach bracket 818 to room side wall 38. A cavity 824 is formed within room side wall 38 and opens through a slot 826 formed in plate 820. Alternatively, a cavity 824 may be formed in side wall 38 to receive a box (not shown) formed integral with plate 820 at slot 826. As shown, bracket 818 is disposed adjacent fascia 47 of room 32.

[00099] As best shown in Figures 18A, 18B, as room 32 is moved toward the retracted position, actuator 814 engages fascia 47 of room 32. Specifically, engagement surface 896 of pad 870 engages fascia 47, pivoting actuator 814 about barrel 804 such that first portion 802 moves into opening 831. Accordingly, second portion 808 of actuator 814 pivots downwardly pulling link 816. Link 816 causes latch 812 to pivot about pin 885 such that finger 887 moves through opening 899 of edge channel 801. Cavity 824 simultaneously becomes aligned with finger 887. As shown in Figure 18B, when room 32 moves into the fully retracted position, finger 887 passes through opening 826 of bracket 818 into cavity 824. Camming surface 897 of finger 887 operates against edge 826A of opening 826, thereby drawing fascia 47 into engagement with the perimeter of side wall opening 30, compressing seal 50. When room 32 is moved from the retracted position, return spring 864 causes latch 812 to pivot in a clockwise direction (as viewed in Figure 17) out of cavity 824 and back into edge channel 801, thereby releasing room 32. As a result, actuator 814 moves into the position shown into Figure 17.

[000100] Figure 19 shows another embodiment of a latching mechanism according to the present invention. Latching mechanism 900 includes a latch 912, an actuator (not shown), a link 916, and a bracket 918. It should be understood that the actuator used with latching mechanism 900 may be any of the actuators previously described. Additionally, the actuator may be mounted within housing 910 which is shown mounted adjacent fascia 47.

[000101] Latch 912 includes a body 993 which defines an opening 991 for receiving link 916. Link 916 is attached to body 993 at end cap 902. Latch 912 also includes a barrel 904 mounted for pivotal movement about pin 995 which is carried by bracket 906. Bracket 906 is mounted in a standard fashion to an upper corner of room 32 formed by side wall 38 and ceiling 40. Latch 912 further includes a finger 987 which extends from barrel 904 at a fixed angular relationship to body 993. As was the case with finger 887 of Figures 17, 18A, and 18B, finger 987 includes a camming surface 997 for engaging

bracket 918 as is further described below. As shown, link 916 extends from body 993 into housing 910 through opening 908 to the actuator below.

[000102] Bracket 918 is substantially identical to bracket 818 shown in Figure 17. Bracket 918 is mounted to the upper edge 30A of opening 30 such that cavity 924 extends into side wall 12 above opening 30. Bracket 918 is mounted to align with finger 987 when room 32 is moved to the retracted position.

[000103] As should be apparent from the foregoing, as room 32 is moved toward the retracted position, the actuator engages side wall 12 of vehicle 10 and draws link 916 downwardly. As link 916 is moved downwardly, latch 912 pivots about pin 995 and finger 987 moves upwardly into cavity 924. Camming surface 997 engages the front edge of opening 926 and cavity 924. As finger 987 is further pivoted about pin 995, camming surface 997 draws fascia 47 into sealing engagement with the perimeter of opening 30 formed by vehicle side wall 12, compressing seal 50. A return spring (not shown) may extend between bracket 906 and finger 987 to return latch 912 to the position shown in Figure 19 when room 32 is moved out of the retracted position. The return spring may alternatively be coiled about pin 995 and connected to finger 987 so as to bias finger 987 in a counter-clockwise direction as viewed in Figure 19.

[000104] Referring now to Figures 20, 21, latching mechanism 1000 includes a latch 1012, a link 1016, and an actuator (not shown) of any of the type described above. Latching mechanism 1000 further includes a bracket or rain dam 1018 which may extend along substantially the entire length of room ceiling 40. Bracket or rain dam 1018 includes a first portion 1046 mounted to ceiling 40 and a second portion 1048 extending upwardly, substantially perpendicular to first portion 1046.

[000105] As shown, latch 1012 is mounted within a modified edge channel 1001. Edge channel 1001 includes forward wall 1004, rearward wall 1006, and inner walls 1008, 1010. A slot 1020 is formed in inner walls 1008, 1010 to accommodate downward movement of latch 1012 as further described below. Latch 1012 is formed into the shape of an elongated bar and includes a forward surface 1022, a rearward surface 1024, an upper surface 1026, a lower surface 1028, and ends 1030, 1032. A bore 1034 extends between lower surface 1028 and upper surface 1026 adjacent end 1032. Link 1016 extends into and is retained within bore 1034 by end cap 1036. Another bore 1038 extends between forward surface 1022 and rearward surface 1024 to receive a pivot pin 1040 having one end connected to forward wall 1004 and another end connected to

rearward wall 1006. Rearward surface 1024 defines a cavity 1042 for receiving one end of a spring 1044 which may coil about pin 1040 and connect to rearward wall 1006 to bias latch 1012 upwardly or toward counter-clockwise rotation about pin 1040 as viewed in the figures.

[000106] As shown in Figure 21, when room 32 is moved to the retracted position, the actuator of latching mechanism 1000 pulls link 1016 downwardly. Link 1016 pulls end 1032 of latch 1012 downwardly into opening 1020 against the upward biasing force of spring 1044. The actuator is designed to ensure that when latch 102 moves downwardly, room 32 is sufficiently retracted such that portion 1048 of rain dam 1018 avoids interference with rearward surface 1024 of latch 1012. When in the position shown in Figure 21, latch 1012 prevents room 32 from moving from the retracted position through the interference locking of rain dam 1018 and latch 1012. It should be understood that rearward surface 1024 may include an angled camming surface to draw the fascia 47 of room 32 into firm engagement with the perimeter of opening 30 of vehicle side wall 12 to compress seal 50. Spring 1044 biases latch 1012 upwardly to release rain dam 1018 and room 32 when room 32 is moved out of the retracted position.

[000107] Figures 22-24 show latching mechanism 2900 according to the present invention. Latching mechanism 2900 generally includes a housing 2902 which is built into room 32 as part of the framework of the room. Housing 2902 is shown in Figure 22 as constituting part of the framework of side wall 38 of room 32. It should be understood that an identical latching mechanism 2900 may constitute part of the framework of room side wall 36. Housing 2902 generally includes a body portion 2904, a latch box 2906, and an actuator box 2908. Each of these three components share side walls 2910, 2912. Body portion 2904 further includes an inner wall 2914 and an outer wall 2916. Latch box 2906 includes an upper wall 2918, a lower wall 2920, and an end wall 2922. A protrusion 2924 extends from end wall 2922 to mate with an adjacent frame member. Actuator box 2908 similarly includes an upper wall 2926, a lower wall 2928, and an end wall 2930. A protrusion 2932 extends from end wall 2930 to mate with an adjacent frame member. Side wall 2910 defines an opening 2934 at latch box 2906 and an opening 2936 at actuator box 2908. A latch 2938 is mounted within latch box 2906, and an actuator 2940 is mounted within actuator box 2908.

[000108] Referring now to Figure 23, latching mechanism 2900 further includes a link 2942, a first pulley 2944, a second pulley 2946, and a third pulley 2948. Latch 2938

includes an engagement plate 2950 which is connected to a barrel 2952. Barrel 2952 is mounted for rotation about a pin 2954 which extends through an opening 2956 formed in barrel 2952 and is connected between latch box upper wall 2918 and lower wall 2920. Engagement plate 2950 defines a slot 2958 through which extends link 2942 as will be further described below.

[000109] Actuator 2940 includes a body 2960 from which extends an engagement pad 2962 and a tab 2964. Body 2960 slides within a pair of opposing channels 2966, 2968 as will be further described below. Channel 2966 is mounted to actuator box upper wall 2926 and channel 2968 is mounted to actuator box lower wall 2928.

[000110] Link 2942 has a first end 2970A which extends through slot 2958 and is connected to barrel 2952. Link 2942 extends around pulley 2944 which is mounted for rotation on a rod 2972 that extends between housing side walls 2910, 2912. Link 2942 also extends around pulley 2946 which is mounted for rotation about a rod 2974 connected between housing side walls 2910, 2912, and pulley 2948 which is mounted for rotation about rod 2976 connected between housing side walls 2910, 2912. A second end 2970B of link 2942 is connected to tab 2964 through tab opening 2978. Link 2942 also includes a stress relief assembly or compensator 2980 as is commonly known in the art.

[000111] As indicated in the drawings, as room 32 is moved from the extended position (Figure 22) toward the retracted position (Figure 24), engagement pad 2962 of actuator 2940 engages the exterior surface of vehicle side wall 12. When engagement pad 2962 engages side wall 12, plate 2950 of latch 2938 is partially within vehicle 10. As room 32 is moved farther toward the retracted position, actuator body 2960 slides within channels 2966, 2968 to the right as shown in Figure 23. Accordingly, tab 2964 pulls link 2942 about pulleys 2948, 2946, and 2944. End 2970A of link 2942 pulls barrel 2952 through counter-clockwise rotation about pin 2954. Latch plate 2950 is therefore rotated outwardly through opening 2934 of latch box 2906 to engage the interior surface of vehicle side wall 12. Consequently, fascia 47 of room 32 is drawn tightly against vehicle side wall 12, thereby compressing seal 50 when room 32 is in the retracted position as shown in Figure 24. When room 32 is moved from the retracted position, a return spring 2982 which is connected between barrel 2952 and housing side wall 2912 causes counter-clockwise rotation of barrel 2952. This rotation draws link 2942 around barrel 2952 and about pulleys 2944, 2946, 2948, thereby moving actuator body 2960 and engagement pad 2962 back to the position shown in Figure 23.

[000112] Figures 25 and 26 show a manual lock 1100 which may be adapted for use with any of the latching mechanisms shown in Figures 1-21 (except Figure 19). Lock 1100 is shown in Figures 25 and 26 as used with a latching mechanism similar to latching mechanism 600 of Figure 14. Lock 1100 includes an extension 1102 which carries an axle 1108 and a pair of wheels 1104, 1106 which rotate on axle 1108. Extension 1102 extends through an opening 1110 formed in modified edge channel 1101. Lock 1100 further includes a body portion 1114 from which extension 1102 extends, a protrusion 1120 with a central opening 1122, a right angle portion 1124, and a handle 1126. Lock 1100 further includes a mounting plate 1128 which is mounted to vehicle side wall 12 in a standard fashion and extends from and is integral with a pivot pin 1130 which is situated within central opening 1122 of protrusion 1120. Accordingly, protrusion 1120 includes an opening (not shown) through which plate 1128 extends. A spring 1132 is captured between handle 1126 and plate 1128 to bias handle 1126 away from plate 1128.

[000113] In the position shown in Figure 25, rollers 1104, 1106 are biased by spring 1132 into engagement with latch 612. Specifically, spring 1132 urges handle 1126 away from plate 1128 such that body 1114 pivots about pivot pin 1130 and extension 1102 is urged inwardly through opening 1110 and rollers 1104, 1106 are biased against latch 612. When room 32 is moved to the retracted position, latch 612 is pulled downwardly as described above. Accordingly, as shown in Figure 26, when latch 612 moves sufficiently downwardly, extension 1102 and rollers 1104, 1106 pivot farther inwardly about pivot pin 1130 over the top of latch 612. Spring 1132 biases lock 1100 to remain in this position. As should be apparent from the drawing, latch 612 is retained in the engaged position by lock 1100. Room 32 may be moved from the retracted position only after an operator pushes handle 1126 against the biasing force of spring 1132 to pivot lock 1100 about pivot pin 1130 such that extension 1102 is partially withdrawn through opening 1110. After extension 1102 is sufficiently withdrawn through opening 1110, latch 612 is free to move upwardly as described above.

[000114] Referring now to Figures 27 and 28, an alternative actuator 1200 is shown connected to a latch 712 which cooperates with a bracket 718 to draw room 32 into the retracted position as described with reference to Figures 16A, 16B. It should be understood that actuator 1200 may readily be adapted for use with any of the latching mechanisms previously described. Actuator 1200 generally includes a first cylinder 1202 having a plunger 1204, a second cylinder 1206 connected to first cylinder 1202 by a hose

1208, and a drive rod 1210 received within second cylinder 1206. Rod 1210 is connected to latch 712, in this example, by eyelet 1212 which extends through lower opening 745 of latch 712.

[000115] As best shown in Figure 28, plunger 1204 includes a head 1214 connected to a rod 1216 which extends into cylinder 1202 through an opening 1218 formed through one end of cylinder 1202. Rod 1216 is connected to a piston 1220 disposed within cylinder 1202. The distance that plunger 1204 extends from cylinder 1202 may readily be made adjustable by, for example, using a threaded rod 1216 and a threaded head 1214. Cylinder 1202 further includes a spring 1217 to bias plunger 1204 outwardly and an opening 1222 which is in flow communication with hose 1208. Similarly, cylinder 1206 includes an opening 1224 which is formed through cylinder 1206 and in flow communication with hose 1208. Cylinder 1206 further includes an opening 1225 through which rod 1210 extends. Rod 1210 is connected at one end to piston 1226 which is situated within cylinder 1206 in a conventional manner. Spring 1228 is also disposed within cylinder 1206 to urge piston 1226 upwardly as viewed in Figure 28.

[000116] In operation, as plunger 1204 is moved to the left by engagement with fascia 47 against the biasing force of spring 1217, piston 1220 forces hydraulic fluid 1230 (or other suitable fluid or gas) through opening 1222, hose 1208, opening 1224, and into cylinder 1206. This movement of fluid 1230 forces piston 1226 downwardly against the biasing force of spring 1228. Accordingly, rod 1210 draws latch 712 downwardly into the latched position as described above. It should be noted that spring 1228 may be optional since return spring 764 draws rod 1210 and piston 1226 upwardly when the room 32 is moved from the retracted position. This upward movement forces fluid 1230 from cylinder 1206 into cylinder 1202 which, along with the biasing force of spring 1217, forces piston 1220 and plunger 1204 to the right (in the direction of movement of room 32). It should be understood that this is a closed system such that movement of one of plunger 1204 or rod 1210 causes corresponding movement of the other of plunger 1204 or rod 1210.

[000117] Figure 29 shows another actuator 1300 according to the present invention. Actuator 1300 includes a bi-directional pump 1332 having a pair of lines 1334, 1336 which are connected to openings 1338, 1340, respectively, on cylinder 1306. Pump 1332 is connected by wires 1342 to a switch 1344 mounted on a portion of edge channel 201 facing room fascia 47. As should be apparent to one of ordinary skill in the art, rod 1310

is connected to a piston (not shown) which divides the interior space of cylinder 1306 into an upper chamber and a lower chamber. Opening 1338 is in communication with the upper chamber, and opening 1340 is in communication with the lower chamber. Rod 1310 is connected to latch 712, for example, by eyelet 1312.

[000118] In operation, when room 32 is moved into the retracted position, fascia 47 contacts switch 1344. When this occurs, right angle pin 765 is disposed within opening 735 and slot 739. When fascia 47 contacts switch 1344, pump 1332 is commanded to pump fluid through line 1334, opening 1338, and into the upper chamber of cylinder 1306. Fluid in the lower chamber is expelled through opening 1340 and line 1336 into a reservoir (not shown) in communication with pump 1332. Accordingly, rod 1310 is forced downwardly and latch 712 engages right angle pin 765 to draw room 32 against vehicle side wall 12 as described above.

[000119] Pump 1332 may also be connected to the electronic switch used to actuate the drive mechanism for moving the room between the extended and retracted positions. Accordingly, when the drive switch is actuated to extend room 32, a signal is sent to pump 1332 to pump fluid through line 1336 and opening 1340 into the lower chamber of cylinder 1206. Fluid is expelled through opening 1338 and line 1334 to the pump reservoir (not shown). Accordingly, rod 1310 moves upwardly such that latch 712 releases right angle pin 765, thereby permitting room 32 to be moved from the retracted position.

[000120] It should be understood that a single action cylinder may be used for cylinder 1306 such that line 1336 and opening 1340 are eliminated and a return spring is disposed within the lower chamber of cylinder 1306.

[000121] Figure 30 shows another embodiment of an actuator according to the present invention. Actuator 1400 is shown in use with a latch 712 and bracket 718 combination. It should be understood, however, that actuator 1400 may be used with any of the latching mechanisms described above. Actuator 1400 includes a bi-directional motor 1446 fixedly mounted within edge channel 201 and connected by wires 1442 to switch 1444 and wires 1443 to a switch (not shown) within vehicle 10 for actuating the drive mechanism to move room 32 between the extended and retracted positions. Motor 1446 rotates nut 1448 about its central, vertical axis when both switch 1444 and the drive mechanism switch (not shown) are actuated. A threaded bolt 1450 is attached at weld 1452 or otherwise attached to a lower portion of latch 712.

[000122] In operation, when the operator actuates the drive mechanism switch to move room 32 to the retracted position, room 32 moves inwardly and fascia 47 of room 32 engages switch 1444. Since both switches are then actuated, motor 1446 rotates nut 1448. Bolt 1450 is thereby drawn downwardly into the internal threaded opening of nut 1448. Accordingly, latch 712 engages right angle pin 765 in the manner described above. When the drive mechanism switch (not shown) is actuated to extend room 32, a signal is sent to motor 1446 to rotate nut 1448 in the opposite direction since switch 1444 is still activated by fascia 47, thereby moving latch 712 upwardly to release right angle pin 765. Room 32 is then moved from the retracted position. Motor 1446 stops when fascia 47 moves out of engagement with switch 1444.

[000123] Figure 31 shows another motorized actuator 1500 which is similar to actuator 1400 shown in Figure 30. Actuator 1500 incorporates an additional motor 1554 which is connected for simultaneous operation with motor 1546 by shaft 1556. Accordingly, both motors 1546, 1554 simultaneously rotate nut 1548, thereby providing additional power with which to pull latch 712 downwardly. It should be understood that although each of motors 1546, 1554 may operate at somewhat different speeds if operated independently, interconnecting shaft 1556 forces both motors 1546, 1554 to operate at the same speed.

[000124] Referring now to Figures 32-36, another embodiment of a latching mechanism according to the present invention for operation adjacent upper edge 30A of opening 30 of side wall 12 is shown. Figure 32 shows latching mechanism 1600 which latches onto a right angle bracket or rain dam 1018 attached to ceiling 40 of slide out room 32 as is further described below. Latching mechanism 1600 includes a mounting bracket 1602, a spring 1604, a latch 1606, a handle 1608, a support 1610 (only one shown) and an axle 1612. Mounting bracket 1602 includes a pair of parallel side walls 1614, 1616 connected together by perpendicular web 1618. Each side wall 1614, 1616 includes a plurality of openings 1620 for receiving fasteners (not shown) used to connect mounting bracket 1602 to upper edge 30A of opening 30 formed in side wall 12 (Figure 33).

[000125] Spring 1604 includes a pair of mounting tabs 1622, 1624 for mounting such as by welding to web 1618. Spring 1604 further includes first and second side walls 1626, 1628 which extend downwardly, perpendicular to their respective tabs 1622, 1624. A curved portion of spring 1604 extends between side walls 1626, 1628 to form a first detent 1630 adjacent side wall 1626 and a second, deeper detent 1632 adjacent side wall 1628.

[000126] Latch 1606 includes a curved body 1634 having a substantially C-shaped cross-section, and a projection 1636 (Figures 35 and 36) disposed at each end of body 1634 for receiving axle 1612. A flexible seal 1638 is attached along the upper edge 1640 of latch 1606.

[000127] Handle 1608 includes a cam 1642 having an opening 1644 for receiving axle 1612, a first extension 1646 extending from cam 1642, a second extension 1648 extending at a right angle from extension 1646 substantially parallel to axle 1612, a third extension 1650 extending at a right angle from second extension 1648 substantially parallel to first extension 1646, and a fourth extension 1652 extending at a right angle from third extension 1650 substantially parallel to second extension 1648. Handle 1608 rotates about axle 1612 with rotation of latch 1606.

[000128] Axle 1612 extends between a pair of supports 1610 (one shown). Each support 1610 includes a mounting plate 1654 having an opening 1656 for receiving a standard fastener to connect support 1610 to web 1618, and a downwardly extending support portion 1658 having an opening 1660 for receiving and supporting axle 1612.

[000129] Referring now to Figure 33, latching mechanism 1600 may be mounted in an upper corner portion of opening 30. Accordingly, when room 32 is in the retracted position as shown in Figure 33, handle 1608 is in an upward position indicating that latching mechanism 1600 is in the latched position. As will be further described below, extension 1652 may be urged toward vehicle side wall 12 to disengage latching mechanism 1600 so that room 32 may be moved to the extended position. When room 32 is in the extended position as shown in Figure 34, the shape of handle 1608 permits the handle to remain recessed within gap 31 and under fascia 47 with only fourth extension 1652 visible.

[000130] It should be understood that extensions 1648, 1650, and 1652 could readily be removed such that handle 1608 is entirely concealed when room 32 is in the extended position. It is only necessary that first extension 1646 extends from within gap 31 when room 32 is in the retracted position as shown in Figure 33.

[000131] Referring now to Figures 35 and 36, rain dam 1018 has a first portion 1046 and a second, perpendicular portion 1048. In operation, as room 32 is moved toward the retracted position (to the left as shown in the figures), rain dam 1018 approaches latch 1606. Eventually, portion 1048 of rain dam 1018 engages edge 1662 of latch 1606. As room 32 is further retracted, rain dam 1018 forces latch 1606 to rotate in a clockwise

direction about axle 1612. As latch 1606 rotates, handle 1608 also rotates about axle 1612. Cam 1642 of handle 1608 is relatively easily moved out of detent 1630. As room 32 is retracted and cam 1642 begins to move into detent 1632, latch 1606 is urged to rotate further in the clockwise direction by the spring force of spring 1604. Accordingly, as shown in Figure 36, latch 1606 pivots over portion 1048 of rain dam 1018 such that seal 1638 engages portion 1048 and is compressed against portion 1048 as latching mechanism 1600 draws fascia 47 into engagement with the perimeter of opening 30, thereby compressing seal 50.

[000132] Since detent 1632 is deeper than detent 1630, a greater force is required to cause cam 1642 to move in a counter-clockwise direction from detent 1632 to detent 1630 than is required to cause cam 1642 to move in a clockwise direction from detent 1630 to detent 1632. Accordingly, a greater force is required to move latching mechanism 1600 from the latched position as shown in Figure 36 to the unlatched position as shown in Figure 35. This force may be provided by an operator manually by pressing extension 1652 toward vehicle side wall 12. This causes handle 1608 to pivot about axle 1612 such that cam 1642 moves into detent 1630, thereby releasing room 32 to be moved out of the retracted position.

[000133] As should be understood from the foregoing, an automatic version of latching mechanism 1600 may be provided by merely eliminating extensions 1646, 1648, 1650 and 1652 and sizing cam 1642 relative to detents 1630, 1632 such that the inward moving force of rain dam 1018 causes latch 1606 to move into the latched position of Figure 36, and the outward force of moving room 32 out of the retracted position is sufficient to disengage cam 1642 such that it pivots into detent 1630. The greater force required to automatically unlatch latch 1606 by moving cam 1642 from detent 1632 to detent 1630 is inherently provided by the configuration of typical slide out rooms 32 and the manner in which the drive mechanisms are connected thereto. Specifically, referring to Figure 3, as support tubes 44, 46 are extended, the lower portion of room 32 is moved outwardly which tends to urge the inner edge of room floor 35 downwardly, against vehicle floor 20. A relatively large outward force may then be applied to the lower portion of room 32 since the engagement between the room and vehicle floors will maintain room 32 in a substantially horizontal orientation. Thus, a relatively large outward force is translated to the upper portion of room 32 to disengage latch 1606. When room 32 is retracted, the amount of force which may be applied to room 32 at the end of its inward

travel (and therefore the amount of force translated to the top of room 32 to latch 1606) is limited. When room 32 reaches its retracted position, additional inward pulling of the lower portion of room 32 by support tubes 44, 46 tends to cause room 32 to pivot about the outer edge of vehicle floor 20. Thus, this additional inward force is not translated to the upper portion of room 32.

[000134] Figures 37-40 show another latching mechanism 1700 according to the teachings of the present invention. Latching mechanism 1700 generally includes a container 1702 mounted to side wall 38 of room 32, and a release lever 1704 for disengaging a latch 1706 as further described below. It should be understood that a pair of latching mechanisms 1700 could be used, one mounted to side wall 36 and one mounted to side wall 38. It should be further understood that latching mechanisms 1700 could readily be rotated ninety degrees and either mounted to the top of ceiling 40 or built into ceiling 40 such that latch 1706 protrudes through gap 31 to clamp the vertical edges of vehicle side wall opening 30. Latching mechanism 1700 is shown in Figure 37 in an engaged position with latch 1706 engaging the interior surface of vehicle side wall 12. Figure 38 shows latching mechanism 1700 in a disengaged position as room 32 is moved toward the extended position. The edge of container 1702 opposite fascia 47 is tapered such that container 1702 moves through wiper seal 51 without damaging the seal.

[000135] Figure 39 is a sectional view of latching mechanism 1700 taken substantially along line 39-39 of Figure 37. Container 1702 includes an inner wall 1708, a lower wall 1710, and a side wall 1709 (shown in Figures 37 and 38, removed in Figures 39 and 40). Lower wall 1708 defines a slot 1712 through which lever 1704 extends. Lever 1704 includes an opening 1714 adjacent end 1716, a cam 1718, an opening 1720 adjacent end 1723, and a handle portion 1722 adjacent end 1724. A rod 1726 is fixedly mounted within container 1702 and extends through opening 1714 such that lever 1704 may pivot about rod 1726.

[000136] Latching mechanism 1700 further includes a return spring 1728 having a first end 1730 which extends through an opening 1732 formed in a support tab 1734 fixedly mounted to inner wall 1708, and a second end 1736 which extends through opening 1720 of lever 1704. Accordingly, spring 1728 biases lever 1704 upwardly for clockwise rotation about rod 1726.

[000137] Latch 1706 generally includes a body 1738, a first finger 1740, and a second finger 1742. Body 1738 defines an opening 1744 through which extends a pivot

post 1746 fixedly mounted within container 1702. A spring 1748 is mounted between latch 1706 and container 1702 such that spring 1748 biases latch 1706 for rotation in a clockwise direction about post 1746. Body 1738 further defines a first detent 1750 formed adjacent first finger 1740 and a second detent 1752 formed adjacent second finger 1742. Second detent 1752 includes a locking surface 1754 for cooperating with cam 1718 to retain latch 1706 in the latched position shown in Figure 39.

[000138] In operation, an operator moves handle portion 1722 toward back wall 34 to withdraw cam 1718 from second detent 1752. Room 32 is then moved outwardly from the retracted position using a conventional drive mechanism. As room 32 moves outwardly, interference between first finger 1740 and the inner surface of edge channel 201 causes latch 1706 to pivot in a counter-clockwise direction about post 1746. When room 32 moves sufficiently outwardly such that cam 1718 clears locking surface 1754, the operator may release lever 1704. As room 32 continues to move outwardly, cam 1718 rides along the edge of latch 1706 as latch 1706 rotates in a counter-clockwise direction against the biasing force of spring 1748. Cam 1718 eventually enters detent 1750 and retains latch 1706 in the position of Figure 40 such that finger 1740 clears edge channel 201 and wiper 51 during further outward extension of room 32.

[000139] Referring now to Figure 40, the upward biasing force provided by spring 1728 urges cam 1718 into engagement with detent 1750, thereby preventing clockwise rotation of latch 1706 despite the presence of a clockwise biasing force provided by spring 1748. When room 32 is moved toward the retracted position, second finger 1742 engages the outer surface of edge channel 201. Even a relatively small amount of inward force applied to room 32 will cause counter-clockwise rotation of latch 1706 because of the shallowness of detent 1750 and the biasing force of spring 1748. As latch 1706 rotates in a clockwise direction, finger 1740 engages the inner surface of edge channel 201 and draws room 32 inwardly such that fascia 47 engages the perimeter of opening 30 formed by side wall 12, thereby compressing seal 50. Also during this rotation, cam 1718 rides along the outer edge of latch 1706 and snaps into detent 1752 under the biasing force of spring 1728 when latch 1706 rotates into its latched position shown in Figure 39.

[000140] Figures 41 and 42 show another embodiment of a latching mechanism according to the present invention. Latching mechanism 1800 includes a pair of lower wedges 1802 (one shown) each having a mounting surface 1804, a back surface 1806, a camming surface 1808, and a pair of side surfaces 1803, 1805. As shown, each lower

wedge 1802 is mounted to the bottom surface of room floor 35 adjacent one of side walls 36, 38.

[000141] Latching mechanism 1800 further includes a pair of upper wedges 1810, each including a mounting surface 1812, an inner surface 1814, a pair of side surfaces 1816, 1818, a top surface 1820, and a camming surface 1822. Mounting surface 1812 is attached in a conventional manner to the upper surface of room ceiling 40. It should be understood that a single upper wedge 1810, or more than two upper wedges 1810, may be used to accomplish the function of the present invention. Moreover, the width between surfaces 1816, 1818 of each of wedges 1810 and the width between side surfaces 1803, 1805 of each of wedges 1802 may vary from a relatively small fraction of the total width between room side walls 36, 38 to approximately the entire width of room 32.

[000142] Latching mechanism 1800 further includes a modified edge channel 1801 along upper edge 30A of opening 30. Edge channel 1801 includes a lower edge 1824, and a camming edge 1826. It should be understood that ramp 1840 along the lower edge of opening 30 may be a standard ramp.

[000143] In operation, as slide out room 32 is moved toward the retracted position, camming surfaces 1808 of lower wedges 1802 engage ramp 1840, thereby causing the outer portion of room 32 to lift upwardly. Upper wedges 1810 are positioned such that when lower wedges 1802 begin to cause upward movement, upper surfaces 1820 of upper wedges 1810 have cleared lower edge 1824 of modified edge channel 1801. Accordingly, camming surfaces 1822 engage camming surface 1826, thereby drawing fascia 47 into engagement with the outer surface of vehicle side wall 12 with further upward lifting of room 32 by lower wedges 1802 into the position shown in Figure 42. Accordingly, seal 50 is compressed between fascia 47 and side wall 12.

[000144] Figures 43 and 44 show an alternate latching mechanism 1900. Latching mechanism 1900 includes a modified edge channel 1901 which is the same as edge channel 1801 shown in Figures 41 and 42. Latching mechanism 1900 further includes an angled rain dam 1910. Rain dam 1910 includes a mounting flange 1912 which is mounted to room ceiling 40 in a conventional manner, and an angled flange 1914 extending from mounting flange 1912. Angled flange 1914 includes an upper edge 1920 and a camming surface 1922. It should be understood that rain dam 1910 may extend substantially the entire width of room 32, but two short segments of rain dam material (or multiple segments) each mounted adjacent a side wall 36, 38, would nonetheless accomplish the

function of the present invention of drawing the upper edge of room 32 into engagement with vehicle side wall 12.

[000145] Latching mechanism 1900 substitutes lower wedges 1802 of Figures 41 and 42 with roller assemblies 1928 (one shown). Roller assembly 1928 includes a mount 1930 which is attached to a lower surface of room floor 35 in a conventional manner, an axle 1932, and a pair of rollers 1934 supported by axle 1932. Alternatively, a single roller could be used if mount 1930 were modified to support axle 1932 at its ends with the single roller disposed between the two support locations. This embodiment of the invention is shown used in conjunction with a ramp 1936 which extends along substantially the entire length of the lower edge of side wall opening 30. Ramp 1936 includes a shelf surface 1938 and a ramp surface 1940.

[000146] Referring now to Figure 44, in operation, as room 32 is moved toward the retracted position, rollers 1934 roll along shelf surface 1938, and up ramp surface 1940. When rollers 1934 begin moving up ramp surface 1940, edge 1920 of rain dam 1910 will have been sufficiently retracted within vehicle 10 to have cleared lower edge 1924 of modified edge channel 1901. Accordingly, as rollers 1934 move upwardly on ramp surface 1940, camming surface 1922 of rain dam 1910 engages camming surface 1926 of modified edge channel 1901 to draw fascia 47 into sealing engagement with the perimeter of vehicle opening 30 as described above.

[000147] Figures 45 and 46 show an alternate embodiment of a latching mechanism according to the present invention. Latching mechanism 2000 includes a standard ramp 2036 and roller assemblies 2028 which are substantially identical to ramp 1936 and roller assemblies 1928 shown in Figures 43 and 44. Latching mechanism 2000 further includes rain dam 2010 which has a mounting flange 2012 and an angled flange 2014. Mounting flange 2012 is mounted to ceiling 40 of room 32 in a conventional manner. Angled flange 2014 includes an upper edge 2020 and a camming surface 2022.

[000148] Latching mechanism 2000 further includes modified edge channel 2001 which includes conventional forward and rearward walls 2042, 2044, respectively, a lower wall 2046 interconnecting forward wall 2042 and rearward wall 2044, a rib 2048 which extends downwardly into gap 31 from lower wall 2046, and wiper seal 51 which is attached in a conventional manner to rib 2048. Modified edge channel 2001 further includes a downwardly projecting lip 2052 for cooperating with camming surface 2022 as is further described below.

[000149] Referring now to Figure 46, as room 32 is moved toward the retracted position, rollers 2034 roll along shelf surface 2038 and up ramp 2040. When rollers 2034 begin moving up ramp surface 2040, upper edge 2020 of rain dam 2010 will have cleared lip 2052 of modified edge channel 2001. As rollers 2034 move upwardly on ramping surface 2040, camming surface 2022 of angled flange 2014 cams against the inner surface of lip 2052, thereby drawing fascia 47 into sealing engagement with the perimeter of opening 30 of vehicle side wall 12. As can be seen in the drawings, latching assembly 2000 does not interfere with the use of conventional wiper seal 51.

[000150] Figures 47 and 48 show another embodiment of a latching mechanism according to the present invention. Latching mechanism 2100 includes roller assemblies 2128, and ramp 2136 which are similar to roller assemblies 2028 and ramp 2036 of Figures 45 and 46. Roller assemblies 2128, however, include a pair of mounts 2130 with a single roller 2134 and an axle 2132. Modified edge channel 2101 is substantially similar to modified edge channel 2001 except that lip 2052 of modified edge channel 2001 is not present on modified edge channel 2101. Latching mechanism 2100 further includes upper roller assemblies 2154 (one shown). Each roller assembly 2154 includes a pair of mounts 2156 attached in a conventional manner to ceiling 40 of room 32 adjacent one of side walls 36, 38. Like roller assemblies 2128, each roller assembly 2154 further includes a roller 2158 supported by an axle 2160 which extends through roller 2158 and mounts 2156.

[000151] As room 32 is moved toward the retracted position, roller assemblies 2128 roll along shelf surface 2138 of ramp 2136 and up ramp surface 2140. Rollers 2156 roll under wiper seal 51. As rollers 2134 roll up ramp surface 2140, rollers 2158 are lifted upwardly into engagement with modified edge channel 2101. As rollers 2134 move further upwardly, rollers 2158 draw fascia 47 of room 32 into sealing engagement with the perimeter of opening 30 of vehicle side wall 12.

[000152] Figures 49, 50, 51A and 51B show yet another latching mechanism according to the present invention. As shown in Figure 49, latching mechanism 2200 generally includes an upper edge channel 2202 mounted along the upper edge of opening 30, and a pair of similarly shaped side edge channels 2204, 2206 mounted along the side edges of side wall opening 30. A support 2208 is connected to edge channel 2202, and is movable toward and away from room 32 as is further described below. Similarly, supports 2210, 2212 are attached to edge channels 2204, 2206, respectively, and are

movable toward and away from room 32. Support 2208 supports a wiper seal 2214 which maintains contact with ceiling 40 of room 32 during movement of the room between the extended and retracted positions. Supports 2210, 2212 include similar seals 2216, 2218, respectively. All of the seals perform a standard wiper seal function. A pump 2220 is connected through plumbing 2222 to an expandable member or members which are used to drive supports 2208, 2210, 2212 toward room 32 as is further described below.

[000153] Referring now to Figure 50, it should be understood that the basic structure of edge channels 2202, 2204, 2206, supports 2208, 2210, 2212, and seals 2214, 2216, 2218, is substantially identical. Accordingly, only the components associated with edge channel 2204 will be described herein. Edge channel 2204 has a substantially "H" shaped cross-section including a pair of parallel walls 2224, 2226 and a web 2228 extending between walls 2224, 2226. Channel 2204 receives wall 12 in channel 2230 formed between walls 2224, 2226, and web 2228. Walls 2224, 2226 are attached to vehicle side wall 12 in a standard fashion using fasteners (not shown).

[000154] Support 2210 includes a pair of side walls 2232, 2234, an end wall 2236 extending between side walls 2232, 2234, and a rib 2238 which extends perpendicularly from end wall 2236 as shown in Figure 50. The distance between the inner surfaces of side walls 2232, 2234 is slightly greater than the distance between the outer surfaces of edge channel side walls 2224, 2226. Support side walls 2232, 2234 each include a plurality of slots 2240 which are elongated in a direction perpendicular to end wall 2236. A stud 2242 extends through each slot and is secured to one of edge channel side walls 2224, 2226. Each stud 2242 includes a head 2244 with a diameter larger than the distance across the width of slot 2240, and a post 2246 (Figures 51A and 51B) attached to edge channel 2204. As should be apparent from the figures, studs 2242 retain support 2210 on edge channel 2204. Slots 2240 permit movement of support 2210 toward and away from room 32 in the direction of the axis of elongation of slots 2240.

[000155] Wiper 2216 is formed of a resilient, flexible material and includes a body 2246 which forms a groove 2248 for receiving rib 2238. Wiper 2216 further includes a tube portion 2250 which defines an interior space 2252. Wiper 2216 is retained on rib 2238 by barbs 2254, 2256 (Figures 51A and 51B) which engage groove 2248. Finally, latching mechanism 2200 includes an expandable member 2258 disposed within the space bounded by edge channel side walls 2224, 2226, web 2228, support side walls 2232, 2234, and end wall 2236. Expandable member 2258 defines an interior space 2260 for receiving

a suitable fluid or gas to cause expandable member 2258 to expand. Expandable member 2258 may consist of a single elongated member extending substantially the entire length of supports 2208, 2210, and 2212. Alternatively, expandable member 2258 may include multiple segments, each connected to pump 2220 by plumbing 2222 for simultaneous expansion and deflation.

[000156] Referring now to Figures 51A and 51B, as room 32 is moved toward the retracted position, tube 2250 of wiper 2216 maintains contact with side wall 38 of room 32 to perform a standard wiper seal function. When fascia 47 becomes sufficiently close to vehicle side wall 12, a position sensor, contact switch, proximity switch, or other suitable switching mechanism (not shown) activates pump 2220. Pump 2220 pumps an appropriate fluid or gas through plumbing 2222 into interior space 2260 of expandable member 2258. As expandable member 2258 expands, expandable member 2258 forces support 2210 away from web 2228 toward room 32. Support side walls 2232, 2234 slide outwardly relative to edge channel side walls 2226, 2224, guided by studs 2242 which travel within slots 2240. When expandable member 2258 is sufficiently inflated to within a predetermined pressure range, tube 2250 of seal 2216 is compressed against side wall 38 of room 32, thereby retaining room 32 in the retracted position as shown in Figure 51B.

[000157] When room 32 is to be moved from the retracted position, actuation of the drive mechanism for moving room 32 also actuates pump 2220 which deflates expandable member 2258. The resilience of tube 2250 of seal 2216 urges support 2210 from the position shown in Figure 51B to the position shown in Figure 51A. As room 32 is further moved from the retracted position, seal 2216 maintains contact with side wall 38 of room 32 to perform a wiper seal function.

[000158] Referring now to Figures 52 and 53, yet another embodiment of a latching mechanism according to the present invention is shown. Latching mechanism 2300 generally includes edge channel 2304, support 2310, wiper 2316, and expandable member 2358. Like edge channel 2204 of Figures 51A and 51B, edge channel 2304 includes parallel walls 2324, 2326 for attachment to vehicle side wall 12, and a web 2328 interconnecting walls 2324, 2326. Wall 2326 extends from web 2328 toward room 32 to form a hooked wall 2362. An arcuate wall 2364 extends from web 2328 and is connected to wall 2326 by a second web 2366.

[000159] Support 2310 includes an arcuate side wall 2332 connected to an end wall 2336 from which extends a hooked wall 2334 that is interlocked with hooked wall 2362.

A rib 2338 extends from end wall 2336. Wiper 2316 is identical to wiper 2216 and interconnects with rib 2338 in the manner described above. Arcuate side wall 2332 includes a plurality of slots 2340 similar to slots 2240 described above. Likewise, a plurality of studs 2342 extend through slots 2340 to guide movement of support 2310 in a manner similar to that described above with reference with studs 2242. Studs 2342 include heads 2344 and posts 2345 which extend through slots 2340 and are connected to arcuate wall 2364. Finally, latching mechanism 2300 includes expandable member 2358 which defines an interior space 2360. Expandable member 2358 is situated within the space defined by second web 2366, arcuate wall 2364, arcuate side wall 2332, end wall 2336, and hooked wall 2334.

[000160] As should be apparent from the figures, as room 32 is moved toward the retracted position, wiper seal 2316 lightly engages side wall 38 of room 32 to perform a standard wiper seal function. When fascia 47 becomes sufficiently close to vehicle side wall 12, a proximity sensor, contact switch, or other suitable switch (not shown) actuates a pump similar to pump 2220 of Figure 49 which pumps a suitable fluid or gas into space 2360 of expandable member 2358. As expandable member 2358 expands, support 2310 pivots about the interconnection between hooked wall 2334 and hooked wall 2362. As explained above, support 2310 is guided through this motion by studs 2342 and slots 2340. As support 2310 pivots toward room 32, wiper 2316 is compressed against side wall 38 to hold room 32 in the retracted position. It should be understood that the arcuate motion of support 2310 applies an inward pulling force to room 32 such that wiper 2316 grips room 32 and draws it inwardly so that fascia 47 sealingly engages the perimeter of opening 30 formed by vehicle side wall 12, compressing seal 50.

[000161] Figures 54 and 55 show yet another embodiment of a latching mechanism according to the present invention. Latching mechanism 2500 is shown having a modified edge channel 2501 which includes a pair of side walls 2556, 2558 connected together by an end wall 2560. A second end wall 2590 extends from side wall 2556 and carries central wall 2562 which supports wiper seal 51. A support wall 2535 extends between second end wall 2590 and end wall 2560 as shown.

[000162] A bladder 2597 is positioned within a latching member 2507 having five walls including first wall 2593, second wall 2599, third wall 2503, fourth wall 2505, and fifth wall 2595. First wall 2593 and fifth wall 2595 are profiled to move between support wall 2535 and side wall 2558. Fascia 47 includes a bracket 2519 having a first mounting

wall 2521 and a second mounting wall 2531. Bracket 2519 further includes a body 2523 between first wall 2521 and second mounting wall 2531 which is formed to define a recess having a first angled surface 2525, a second angled surface 2529, and a flat surface 2527 extending between the angled surfaces.

[000163] Expandable member 2597 is attached to wall 2503 of the latching member 2407 and end wall 2560 of edge channel 2501. As room 32 is moved toward the retracted position, expandable member 2597 is filled with air, oil, or other suitable substance such that latching member 2507 is extended to cam into the recess formed by bracket 2519 as indicated in Figure 55. It should be understood that the travel of latching member 2507 may be limited in a variety of ways such as by expandable member 2597, studs extending from walls 2593, 2595 into slots formed in edge channel walls 2535, 2558, respectively, or other such structure. It should further be understood that latching member 2507 may be moved to the retracted position shown in Figure 54 during movement of room 32 by suction, a magnet mounted to latching mechanism 2507 and attracted to a plate mounted to edge channel 2501, or a spring extending between latching member 2507 and edge channel 2501.

[000164] Figures 56-60 show yet another embodiment of a latching mechanism according to the present invention. Referring to Figure 56, latching mechanism 2600 generally includes a housing 2602 built into side wall 36 of room 32 as part of the tubular framework (portions shown in dotted lines) of room 32. It should be understood that an identical latching mechanism may be built into side wall 38. For simplicity, only one latching mechanism 2600 is described herein. Housing 2602 includes a latch box 2604 situated approximately midway between floor 35 and ceiling 40 of room 32, and an actuator box 2608 disposed adjacent floor 35 of room 32. A protrusion 2610 extends from latch box 2604 to fit within the interior dimensions of the adjacent tubular frame member, thereby connecting housing 2602 to that framework. Similarly, a protrusion 2612 extends from actuator box 2608 to connect to the adjacent lower tubular frame member. Latch box 2604 further includes a slot 2614 through which extends a latch 2616 for drawing room 32 against vehicle side wall 12 as further described below. Also extending from latch box 2604 through opening 2609 (Figures 59 and 60) is a release lever 2618, the connection and operation of which will also be further described below.

[000165] A post 2620 extends from actuator box 2608 and carries actuator lever 2622 which pivots in the direction of the arrow shown in Figure 56 when actuator lever

2622 engages a portion of vehicle side wall 12 below opening 30, as will be further described below.

[000166] Referring now to Figure 57 wherein housing 2602, latch box 2604, and protrusion 2618 are shown in dashed lines, and Figure 58 wherein side wall 2624 of housing 2602, latch box 2604, and actuator box 2608, is shown removed, latching mechanism 2600 further includes a pulley 2626 mounted for rotation on a rod 2628 which extends between side wall 2624 and side wall 2630 of latch box 2604. A pair of return springs 2632 extend between latch 2616 and a rod 2634 connected to top wall 2636 and bottom wall 2638 of latch box 2604. Additionally, a cylinder 2640 is mounted to bottom wall 2638 of latch box 2604, and includes a spring 2642 which biases a detent ball 2644 upwardly against a retaining shoulder (not shown) which prevents ball 2644 from exiting cylinder 2640. A pivot pin 2646 also extends from bottom wall 2638 of latch box 2604, and a pivot pin 2648 extends between bottom wall 2638 and top wall 2636 of latch box 2604.

[000167] Latch 2616 includes a substantially flat plate 2650 having a first side 2652, a second side 2654, a first end 2656, and a second end 2658. A wedge 2660 extends from second side 2654 of plate 2650 and includes a camming surface 2662. A rod 2664 is attached to second side 2654 of plate 2650. Return springs 2632 are connected to rod 2664. End 2658 of plate 2650 is fixedly connected to a ratchet 2666. Ratchet 2666 includes a central opening 2668 for receiving pivot pin 2648, an upper cylinder 2670, a lower cylinder 2672, and a plurality of ratchet teeth 2674. Each of teeth 2674 includes a camming surface 2676 and a stop surface 2678.

[000168] Release lever 2618 includes an elongated body 2680 from which extends a protrusion 2682 having an opening 2684 for receiving pivot pin 2646. A finger 2686 extends from body 2680 and engages teeth 2674 as will be further described below. Both protrusion 2682 and finger 2686 extend from surface 2688 of body 2680. Body 2680 also includes surface 2690 which engages ball 2644.

[000169] As best shown in Figure 58, latching mechanism 2600 further includes a second pulley 2692 which is connected for rotation about rod 2694. Rod 2694 extends between side wall 2624 and side wall 2630 of housing 2602. A third pulley 2696 is mounted for rotation on rod 2620 which also extends between side walls 2624, 2630.

[000170] Actuator 2622 is fixedly connected to pulley 2696 such that movement of actuator 2622 causes rotation of pulley 2696. Actuator 2622 includes an engagement surface 2698 and a hook 2601 which extends around rod 2620.

[000171] Finally, latching mechanism 2600 includes a link 2603 which may be a cable or other suitable bendable member. Link 2603 extends through an opening 2605 formed in latch 2616 and is retained by an end cap 2607 (Figures 59 and 60). Link 2603 extends around pulley 2626, pulley 2692, and pulley 2696 where it is fixedly connected at an attachment point (not shown).

[000172] Referring now to Figure 59, latching mechanism 2600 is shown in the unlatched position. As room 32 is moved toward the retracted position, camming surface 2698 of actuator 2622 engages side wall 12 and pivots in a counter-clockwise direction (as viewed in Figures 56 and 58) causing pulley 2696 to rotate about rod 2620. This rotation pulls link 2603 around pulley 2692 and pulley 2626 such that latch 2616 and ratchet 2666 rotate about pivot pin 2648. As latch 2616 and ratchet 2666 rotate clockwise as shown in Figures 59 and 60, finger 2686 of release lever 2618 ratchets across camming surfaces 2676 of teeth 2674. During this time, surface 2690 engages ball 2644, thereby holding release lever 2618 in the locked position. As actuator 2622 further rotates as a result of its engagement with vehicle side wall 12, latch 2616 is pulled into the position shown in Figure 60. Accordingly, latch 2616 draws room 32 into vehicle 10 such that fascia 47 is in sealing engagement with the perimeter of opening 30 of side wall 12, compressing seal 50. During this rotation, return springs 2632 are extended.

[000173] When room 32 is in the retracted position, finger 2686 of release lever 2618 engages stop surface 2678 of one of teeth 2674 of ratchet 2666. Accordingly, rotation in a counter-clockwise direction as viewed in Figures 59 and 60 of ratchet 2666 and latch 2616 is prevented. Such counter-clockwise rotation would otherwise occur if the driving mechanism permitted outward movement of the bottom of room 32 since outward movement of the bottom of room 32 would release actuator 2622, causing latch 2616 to loosen its engagement with vehicle side wall 12.

[000174] When room 32 is to be moved from the retracted position, the operator pushes release lever 2618 toward back wall 34 of room 32 such that finger 2686 disengages stop surface 2678 of ratchet teeth 2674. Release lever body 2680 depresses ball 2644 into cylinder 2640 against the biasing force of spring 2642 until release lever 2618 assumes the position shown in dotted lines in Figure 60. By moving release lever

2618 from engagement with teeth 2674, the operator permits springs 2632 to return to their position shown in Figure 59, thereby causing counter-clockwise rotation of ratchet 2666 and latch 2616 about pivot pin 2648. Accordingly, room 32 may be moved from the retracted position. Additionally, link 2603 is rewound around pulley 2696 which includes a biasing spring (not shown) biasing pulley 2696 to rotate in a clockwise direction as viewed in Figure 58.

[000175] Just before latch 2616 assumes the position shown in Figure 59, camming surface 2662 of wedge 2660 engages body 2680 of release lever 2618. As latch 2616 is drawn into its position shown in Figure 59, camming surface 2662 forces release lever body 2680 over ball 2644 into the position shown in Figure 59.

[000176] Figures 61 and 62 show yet another embodiment of a latching mechanism according to the present invention. Referring to Figure 61, latching mechanism 2700 generally includes a housing 2702 having an outer side 2704, an inner side 2706 connected to room side wall 36, an outer edge 2708, an inner edge 2710, an upper wall 2712, and an opened, lower end 2714. It should be understood that an identical housing 2702 and other components, described below, are associated with room side wall 38. For simplicity, only one is described herein. Sides 2704, 2706, and edge 2710 form a notch 2715 adjacent upper wall 2712. Latching mechanism 2700 further includes a latch 2716 and an actuator 2718 as will be further described below. Finally, latching mechanism 2700 includes post assemblies 2720 and 2722. Post assembly 2720 includes a first plate 2724, an integral second plate 2726 which extends perpendicularly from plate 2724 to form a right angle, and a post 2728 which extends from plate 2726 toward room side wall 36. Post assembly 2720 is mounted to vehicle side wall 12 partially within opening 30 with fasteners 2730 which extend through plate 2724. Similarly, post assembly 2722 includes a first plate 2732, a second plate 2734, a post 2736 which extends from second plate 2734 toward room side wall 36, and fasteners 2738 which attach post assembly 2722 to vehicle side wall 12.

[000177] Referring now to Figure 62, latch 2716 is formed from a substantially flat plate and includes an upper opening 2740, a lower opening 2742, and a notch 2744. Notch 2744 includes a stop surface 2746 and a camming surface 2748. Latch 2716 is disposed within housing 2702 such that notch 2744 is aligned with housing opening 2715 and substantially horizontally aligned with post 2728 of post assembly 2720. It should be

noted that when latch 2716 is in the position shown in Figure 62, camming surface 2748 is horizontally above post 2728.

[000178] Actuator 2718 includes a pulley body 2750 having an outer, circumferential groove 2752 and a central opening 2754 for receiving a pivot rod 2756 which extends between housing outer side 2704 and inner side 2706. Actuator 2718 further includes a notch 2758 defined by a first camming surface 2760 and a second camming surface 2762. Actuator 2718 is mounted for rotation on rod 2756 such that a portion of pulley body 2750 extends below lower end 2714 of housing 2702. Camming surface 2760 thus extends below lower end 2714 and is in substantial horizontal alignment with post 2736 of post assembly 2722.

[000179] Latching mechanism 2700 further includes upper pulleys 2764, 2766 mounted for rotation about rods 2768, 2770, respectively. Rods 2768, 2770 extend between housing outer side 2704 and inner side 2706.

[000180] A link 2772 interconnects latch 2716 and actuator 2718. Link 2772 includes a first segment 2774 and a second segment 2776. First segment 2774 is attached at one end 2778 to latch 2716 through opening 2742. First segment 2774 includes a stress relief assembly 2780 as is commonly known in the art. First segment 2774 extends into groove 2752 of pulley body 2750, and is connected at end 2782 to actuator 2718 at an opening (not shown) formed adjacent camming surface 2762.

[000181] Second segment 2776 includes a first end 2784 which is connected to latch 2716 at opening 2740, and a second end 2786 which is connected to actuator 2718 at an opening (not shown) adjacent camming surface 2760. As shown, second segment 2776 extends around pulley body 2750 in groove 2752, and around pulleys 2764, 2766.

[000182] As should be apparent from the drawings, as room 32 is moved toward the retracted position, post 2736 engages camming surface 2760 causing clockwise rotation of actuator 2718 about post 2756. At this time, post 2728 is situated within notch 2744 of latch 2716. As actuator 2718 rotates, first segment 2774 of link 2772 pulls latch 2716 downwardly such that camming surface 2748 engages post 2728, thereby drawing fascia 47 of room 32 into sealing engagement with the perimeter of opening 30 formed by vehicle side wall 12 to compress seal 50. When room 32 is moved from the retracted position, camming surface 2762 of actuator 2718 engages post 2736 causing counter-clockwise rotation of actuator 2718. Consequently, second segment 2776 of link 2772 is

pulled around pulleys 2764, 2766 and pulls latch 2716 upwardly, thereby releasing post 2728 from camming surface 2748 of latch 2716 to permit outward movement of room 32.

[000183] Figure 63 shows an alternate embodiment of latching mechanism 2700 shown in Figures 61 and 62. Latching mechanism 2800 is similar in many respects to latching 2700. Accordingly, the reference designations of like components have been retained, but increased by 100. Latching mechanism 2800 includes a latch 2816 and an actuator 2818 connected together by a link 2872 in the manner described above with reference to latching mechanism 2700. Unlike latching mechanism 2700, these components are mounted within a modified edge channel 2888. Edge channel 2888 is modified to include a notch 2890 which is substantially equivalent to notch 2715 shown in Figures 61 and 62. Edge channel 2888 further includes a second notch 2892 which is located in substantial horizontal alignment with post 2836 of post assembly 2822 so that post 2836 may engage actuator 2818 in the manner described above.

[000184] Post assemblies 2820 and 2822 are mounted to side wall 36 of room 32 such that post 2828 of post assembly 2820 is aligned with notch 2890 and latch 2816, and post 2836 of post assembly 2822 is aligned with notch 2892 and actuator 2818. Post assembly 2820 includes a mounting plate 2824 which is connected to room side wall 36 by fasteners 2830. Similarly, mounting plate 2832 of post assembly 2822 is mounted to room side wall 36 using fasteners 2838. The operation of latching mechanism 2800 is substantially identical to the operation of latching mechanism 2700 described above.

[000185] Although the present invention has been shown and described in detail, the same is to be taken by way of example only and not by way of limitation. Numerous changes can be made to the embodiments described above without departing from the scope of the invention.